Citation:

Barclay AW, Flood VM, Rochtchina E, Mitchell P, Brand-Miller JC. Glycemic index, dietary fiber, and risk of type 2 diabetes in a cohort of older Australians. *Diabetes Care.* 2007 Nov; 30(11): 2,811-2,813.

PubMed ID: 17712022

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To assess the association of glycemic index (GI) and fiber with incidence of type 2 diabetes in older Australians whose dietary intake was estimated by a fully validated food-frequency questionnaire (FFQ).

Inclusion Criteria:

No diabetes at baseline, fasting blood glucose test at either the five- or 10-year follow-up.

Exclusion Criteria:

- FFQs with over 12 missing items or implausible values (less than 500 calories or more than 4,000 calories per day) or missing data on study variables
- Participants who did not have fasting blood glucose test at five- or 10-year follow-up.

Description of Study Protocol:

Recruitment

4,433 Australian residents aged 49 years and over were identified in 1991, of which 3,654 participated in detailed examinations between 1992 and 1994. Of these, 2,335 returned for five-year and 1,952 for 10-year examinations (2002 to 2004).

Design

Prospective cohort with 10-year follow-up.

Dietary Intake/Dietary Assessment Methodology

145-item semiquantitative FFQ.

Statistical Analysis

- Hazard ratios and 95% CIs were obtained. Multivariate-adjusted discrete logistic regression models were constructed to assess factors associated with diabetes using three time points at which presence or absence of the outcome was recorded
- Further analyses were conducted by age stratification.

Data Collection Summary:

Timing of Measurements

Exams were conducted at baseline (1992 to 1994), and at five- and 10-year follow-ups.

Dependent Variables

Diabetes: Self-reported diabetes and current use of diabetes medications or fasting glucose concentration higher than 126mg per dL.

Independent Variables

- Daily intake of carbohydrate, sugar, starch, fiber, cereal fiber, fruit fiber and vegetable fiber
- Average daily glycemic index: Summed weighted glycemic index of individual foods, with weighting proportional to the contribution to total carbohydrate intake.

Control Variables

- Age
- Sex
- Family history of diabetes
- Smoking
- Triglycerides
- HDL-cholesterol
- METS of physical activity
- Vegetable fiber.

Description of Actual Data Sample:

- *Initial N:* 2,123
- *Attrition (final N):* 1,833
- *Age:* 49 years or older
- *Ethnicity:* Largely Caucasian
- *Other relevant demographics:* Broadly representative of the older Australian population
- *Location:* Australia.

Summary of Results:

Multivariate-adjusted[a] Hazard Ratios (95% CIs) for Vegetable Fiber and Glycemic Index and Incidence of Type 2 Diabetes in a Cohort of Older Australians

Variables	Hazard Ratio (95% CI)	P-value
Vegetable fiber	0.76 (0.57, 0.99)	0.048
Less than 70 years of age[b]	0.78 (0.56, 1.07)	0.123
70 or more years of age[c]	0.69 (0.40, 1.21)	0.199
Glycemic index	1.50 (0.95, 2.36)	0.082
Less than 70 years of age[b]	1.75 (1.05, 2.92	0.031
70 or more years of age[c]	0.80 (0.29, 2.24)	0.671

[a] Adjusted for sex, family history of diabetes, smoking, triglycerides, HDL-C, and METS of physical activity, as well as vegetable fiber for the glycemic index analysis.

[b] N=1,575.

[c] N=560.

Other Findings

- During 10 years of follow-up, 138 incident cases of type 2 diabetes were identified among 1,833 subjects
- Total carbohydrate, starch, sugar and total fiber intake were not associated with diabetes risk.

Author Conclusion:

- Vegetable fiber was independently associated with reduced type 2 diabetes over a 10-year period in a representative sample of older Australians
- In a secondary analysis of subjects less than 70 years of age, a high GI carbohydrate diet was associated with an increased risk of diabetes.

Reviewer Comments:

- *Author-identified limitations:*
  - *The study had a small sample size and number of incident diabetes cases*
  - *The FFQ was not originally designed to assess GI, although authors' analyses suggest that it is an adequate tool*
- *Publication is a brief report, so methods section is limited.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A

2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	No
2.4.	Were the subjects/patients a representative sample of the relevant population?	???
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes

3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	???
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	???
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	N/A
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes

6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	???
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	???
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	N/A
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes

9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes